



**WTF12L-24162220A00**

W12

**PHOTOELECTRIC SENSORS**

**SICK**  
Sensor Intelligence.



## Ordering information

| Type               | part no. |
|--------------------|----------|
| WTF12L-24162220A00 | 1126063  |

Other models and accessories → [www.sick.com/W12](http://www.sick.com/W12)

Illustration may differ

## Detailed technical data

### Features

|   |   |
|---|---|
| <b>Functional principle</b>   | Photoelectric proximity sensor  |
| <b>Functional principle detail</b>  | Foreground suppression  |
| <b>Sensing range</b>  |   |
| Sensing range min.  | 20 mm   |
| Sensing range max.  | 150 mm  |
| Adjustable switching threshold for background suppression                                       | 35 mm ... 150 mm  |
| Reference object  | Object with 90% remission factor (complies with standard white according to DIN 5033) |
| Minimum object height at set sensing range in front of black background (6% remission factor)   | 1.8 mm, At 45 mm distance   |
| Recommended sensing range for the best performance  | 35 mm ... 70 mm   |
| <b>Emitted beam</b>   |   |
| Light source  | Laser   |
| Type of light   | Visible red light   |
| Shape of light spot   | Ellipse shape   |
| Light spot size (distance)  | 0.34 mm x 0.18 mm (45 mm)   |
| Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle) | < +/- 1.0° (at Ta = +23 °C)   |
| <b>Focus position</b>   | 45 mm   |
| <b>Key laser figures</b>  |   |
| Normative reference   | EN 60825-1:2014, IEC 60825-1:2014   |
| Laser class   | 1   |
| Wave length   | 655 nm  |
| Pulse duration  | 4 µs  |
| Maximum pulse power   | < 4.03 mW   |
| Average service life  | 50,000 h at Tu = +25 °C   |
| <b>Smallest detectable object (MDO) typ.</b>  |   |

|                             |                       |   |
|-----------------------------|-----------------------|---|
|                             |                       | 0.15 mm (At 45 mm distance)<br>Object with 90% remission factor (complies with standard white according to DIN 5033)      |
| <b>Adjustment</b>           | Teach-Turn adjustment | BluePilot: For setting the sensing range  |
|                             | IO-Link               | For configuring the sensor parameters and Smart Task functions  |
| <b>Display</b>              | LED blue              | BluePilot: sensing range indicator  |
|                             | LED green             | Operating indicatorStatic on: power on/Flashing: IO-Link mode   |
|                             | LED yellow            | Status of received light beamStatic on: object presentStatic off: object not present                                      |
| <b>Special applications</b> |                       | Detecting small objects, Detection of objects moving at high speeds, Detecting flat objects, Detecting perforated objects |

## Safety-related parameters

|                                     |           |
|-------------------------------------|-----------|
| <b>MTTF<sub>D</sub></b>             | 280 years |
| <b>DC<sub>avg</sub></b>             | 0 %       |
| <b>T<sub>M</sub> (mission time)</b> | 10 years  |

## Communication interface

|                             |  |
|-----------------------------|--|
| <b>IO-Link</b>              | ✓, IO-Link V1.1  |
| Data transmission rate      | COM2 (38,4 kBaud)  |
| Cycle time                  | 2.3 ms   |
| Process data length         | 16 Bit   |
| Process data structure      | Bit 0 = switching signal Q <sub>L1</sub><br>Bit 1 = switching signal Q <sub>L2</sub><br>Bit 2 ... 15 = Current receiver level (live) |
| VendorID                    | 26   |
| DeviceID HEX                | 0x8002D8   |
| DeviceID DEC                | 8389336  |
| Compatible master port type | A  |
| SIO mode support            | Yes  |

## Electronics

|                                     |  |
|-------------------------------------|--|
| <b>Supply voltage U<sub>B</sub></b> | 10 V DC ... 30 V DC <sup>1)</sup>                                      |
| <b>Ripple</b>                       | ≤ 5 V  |
| <b>Usage category</b>               | DC-12 (According to EN 60947-5-2)<br>DC-13 (According to EN 60947-5-2) |
| <b>Current consumption</b>          | ≤ 14 mA, without load. At U <sub>B</sub> = 24 V                        |
| <b>Protection class</b>             | III  |
| <b>Digital output</b>               |  |
| Number                              | 2 (Complementary)  |
| Type                                | Push-pull: PNP/NPN   |
| Switching mode                      | Light/dark switching   |

<sup>1)</sup> Limit values.<sup>2)</sup> Signal transit time with resistive load in switching mode.<sup>3)</sup> With light/dark ratio 1:1.<sup>4)</sup> This switching output must not be connected to another output.

|                               |  |
|-------------------------------|--|
| Signal voltage PNP HIGH/LOW   | Approx. $U_B$ -2.5 V / 0 V   |
| Signal voltage NPN HIGH/LOW   | Approx. $U_B$ / < 2.5 V  |
| Output current $I_{max}$      | $\leq 100$ mA  |
| Circuit protection outputs    | Reverse polarity protected   |
|                               | Overcurrent protected  |
|                               | Short-circuit protected  |
| Response time                 | $\leq 200$ $\mu$ s <sup>2)</sup>   |
| Repeatability (response time) | 85 $\mu$ s <sup>2)</sup>   |
| Switching frequency           | 2,500 Hz <sup>3)</sup>   |
| <b>Pin/Wire assignment</b>    |  |
| BN 1                          | +(L+)  |
| WH 2                          | $\bar{Q}_{L1}$ /MFDigital output, dark switching, object present $\rightarrow$ output $\bar{Q}_{L1}$ HIGH <sup>4)</sup> The pin 2 function of the sensor can be configured |
|                               | Additional possible settings via IO-Link   |
| BK 3                          | -(M)   |
| BK 4                          | QL1/CDigital output, light switching, object present $\rightarrow$ output QL1 LOW <sup>4)</sup> The pin 4 function of the sensor can be configured                         |
|                               | Additional possible settings via IO-Link   |

<sup>1)</sup> Limit values.<sup>2)</sup> Signal transit time with resistive load in switching mode.<sup>3)</sup> With light/dark ratio 1:1.<sup>4)</sup> This switching output must not be connected to another output.

## Mechanics

|   |                             |
|---|-----------------------------|
| <b>Housing</b>  | Rectangular                 |
| <b>Dimensions (W x H x D)</b>                         | 15.6 mm x 49.5 mm x 43.1 mm |
| <b>Connection</b>                                     | Male connector M12, 4-pin   |
| <b>Material</b>                                       |                             |
| Housing   | Metal, zinc diecast         |
| Front screen  | Plastic, PMMA               |
| Male connector  | Plastic, VISTAL®            |
| <b>Weight</b>   | Approx. 77 g                |
| <b>Maximum tightening torque of the fixing screws</b> | 1.4 Nm                      |

## Ambient data

|                                      |  |
|--------------------------------------|--|
| <b>Enclosure rating</b>              | IP66 (EN 60529)<br>IP67 (EN 60529)<br>IP69 (EN 60529)  |
| <b>Ambient operating temperature</b> | -20 °C ... +55 °C  |
| <b>Ambient temperature, storage</b>  | -40 °C ... +70 °C  |
| <b>Warm-up time</b>                  | < 15 min, Where $T_u$ is under -10 °C  |
| <b>Typ. Ambient light immunity</b>   | Artificial light: $\leq 50,000$ lx<br>Sunlight: $\leq 50,000$ lx                                     |
| <b>Shock resistance</b>              | 50 g, 11 ms (25 positive and 25 negative shocks along X, Y, Z axes, 150 total shocks (EN60068-2-27)) |

|  |   |
|--|---|
| <b>Vibration resistance</b>                | 10 Hz ... 2,000 Hz (Amplitude 0.5 mm / 10 g, 20 sweeps per axis, for X, Y, Z axes, 1 octave/min, (EN60068-2-6)) |
| <b>Air humidity</b>                        | 35 % ... 95 %, relative humidity (no condensation)  |
| <b>Electromagnetic compatibility (EMC)</b> | EN 60947-5-2  |
| <b>Resistance to cleaning agent</b>        | ECOLAB  |
| <b>UL File No.</b>                         | NRKH.E181493 & NRKH7.E181493  |

### Smart Task

|                            |  |
|----------------------------|--|
| <b>Smart Task name</b>     | Base logics  |
| <b>Logic function</b>      | Direct<br>AND<br>OR  |
| <b>Timer function</b>      | Deactivated<br>Switch-on delay<br>Off delay<br>ON and OFF delay<br>Impulse (one shot)          |
| <b>Inverter</b>            | Yes  |
| <b>Switching frequency</b> | SIO Logic: 2000 Hz <sup>1)</sup><br>IOL: 1600 Hz <sup>2)</sup>                                 |
| <b>Response time</b>       | SIO Logic: 250 $\mu$ s <sup>1)</sup><br>IOL: 300 $\mu$ s <sup>2)</sup>                         |
| <b>Repeatability</b>       | SIO Logic: 120 $\mu$ s <sup>1)</sup><br><sup>2)</sup>  |
| <b>Switching signal</b>    | Switching signal $Q_{L1}$ Switching output<br>Switching signal $\bar{Q}_{L1}$ Switching output |

<sup>1)</sup> Use of Smart Task functions without IO-Link communication (SIO mode).

<sup>2)</sup> Use of Smart Task functions with IO-Link communication function.

### Diagnosis

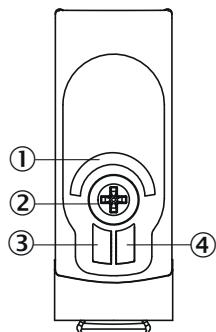
|  |                                      |
|--|--------------------------------------|
| <b>Device temperature</b>                          |                                      |
|  | Measuring range                      |
|  | Very cold, cold, moderate, warm, hot |
| <b>Device status</b>                               | Yes                                  |
| <b>Detailed device status</b>                      | Yes                                  |
| <b>Operating hour counter</b>                      | Yes                                  |
| <b>Operating hours counter with reset function</b> | Yes                                  |
| <b>Quality of teach</b>                            | Yes                                  |

### Classifications

|                     |          |
|---------------------|----------|
| <b>ECLASS 5.0</b>   | 27270904 |
| <b>ECLASS 5.1.4</b> | 27270904 |
| <b>ECLASS 6.0</b>   | 27270904 |
| <b>ECLASS 6.2</b>   | 27270904 |
| <b>ECLASS 7.0</b>   | 27270904 |
| <b>ECLASS 8.0</b>   | 27270904 |
| <b>ECLASS 8.1</b>   | 27270904 |

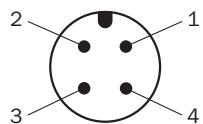
|                       |          |
|-----------------------|----------|
| <b>ECLASS 9.0</b>     | 27270904 |
| <b>ECLASS 10.0</b>    | 27270904 |
| <b>ECLASS 11.0</b>    | 27270904 |
| <b>ECLASS 12.0</b>    | 27270903 |
| <b>ETIM 5.0</b>       | EC002719 |
| <b>ETIM 6.0</b>       | EC002719 |
| <b>ETIM 7.0</b>       | EC002719 |
| <b>ETIM 8.0</b>       | EC002719 |
| <b>UNSPSC 16.0901</b> | 39121528 |

## display and adjustment elements



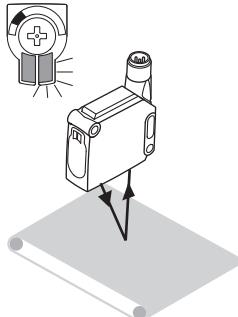
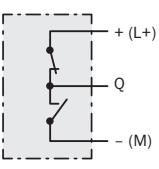
- ① LED blue
- ② Teach-Turn adjustment
- ③ LED green
- ④ LED yellow

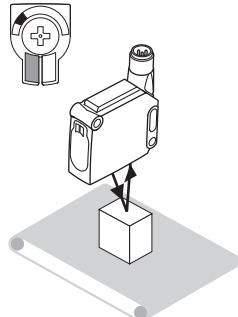
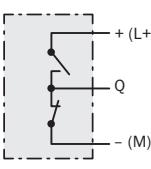
## Connection type M12 male connector, 4-pin



## Truth table Push-pull: PNP/NPN - light switching Q

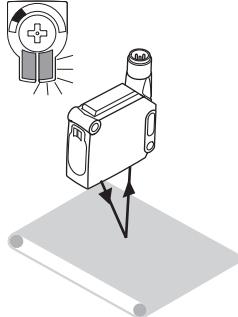
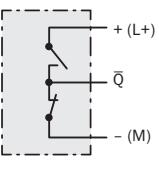
|                         | Light switching Q (normally closed (upper switch), normally open (lower switch)) |                             |
|-------------------------|--|-----------------------------|
|                         | Object not present → Output HIGH   | Object present → Output LOW |
| Light receive           | ✓  | ✗                           |
| Light receive indicator | ✗  | ✗                           |
| Load resistance to L+   | ✗  | ⚡                           |
| Load resistance to M    | ⚡  | ✗                           |

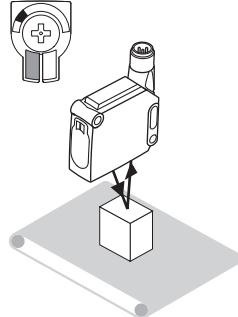
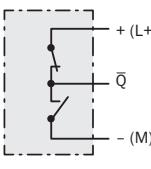
  


Truth table Push-pull: PNP/NPN – dark switching  $\bar{Q}$ 

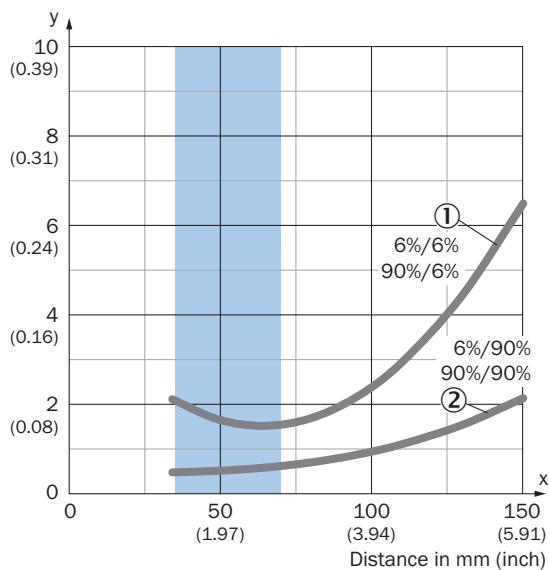
|                         | Dark switching $\bar{Q}$ (normally open (upper switch), normally closed (lower switch)) |                              |
|-------------------------|---|------------------------------|
|                         | Object not present → Output LOW   | Object present → Output HIGH |
| Light receive           | ✓   | ✗                            |
| Light receive indicator | ✗   | ✗                            |
| Load resistance to L+   | ⚡   | ✗                            |
| Load resistance to M    | ✗   | ⚡                            |

## Characteristic curve

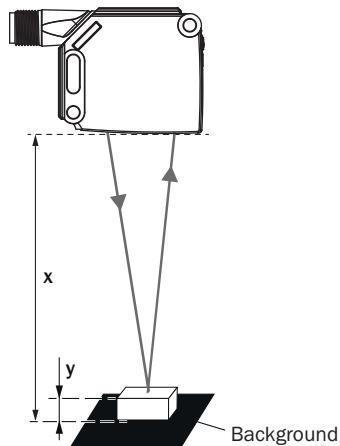
Minimum object height in mm (inch)



■ Recommended sensing range for the best performance

① Black background, 6% remission factor  
 ② White background, 90% remission factor

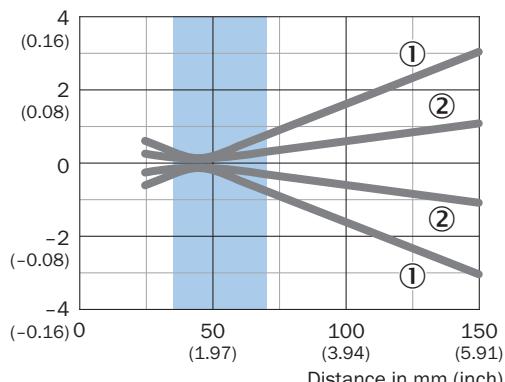
Example:  
 Reliable detection of the object



Black background (6 % remission factor)  
 Distance of sensor to background x = 45 mm  
 Required minimum object height y = 1.8 mm  
 For all objects regardless of their colors

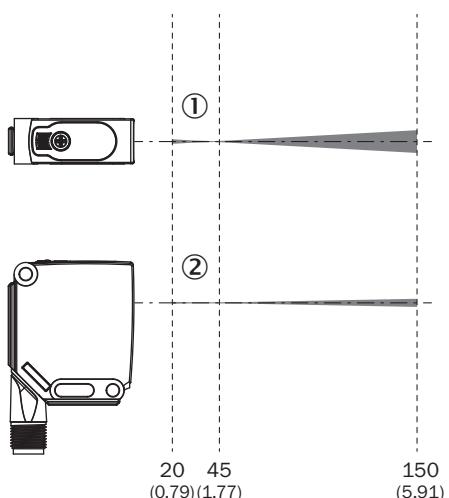
## Light spot size

Dimensions in mm (inch)

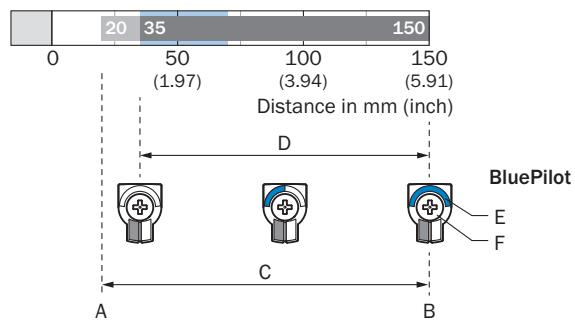


■ Recommended sensing range for the best performance

① Light spot horizontal  
 ② Light spot vertical



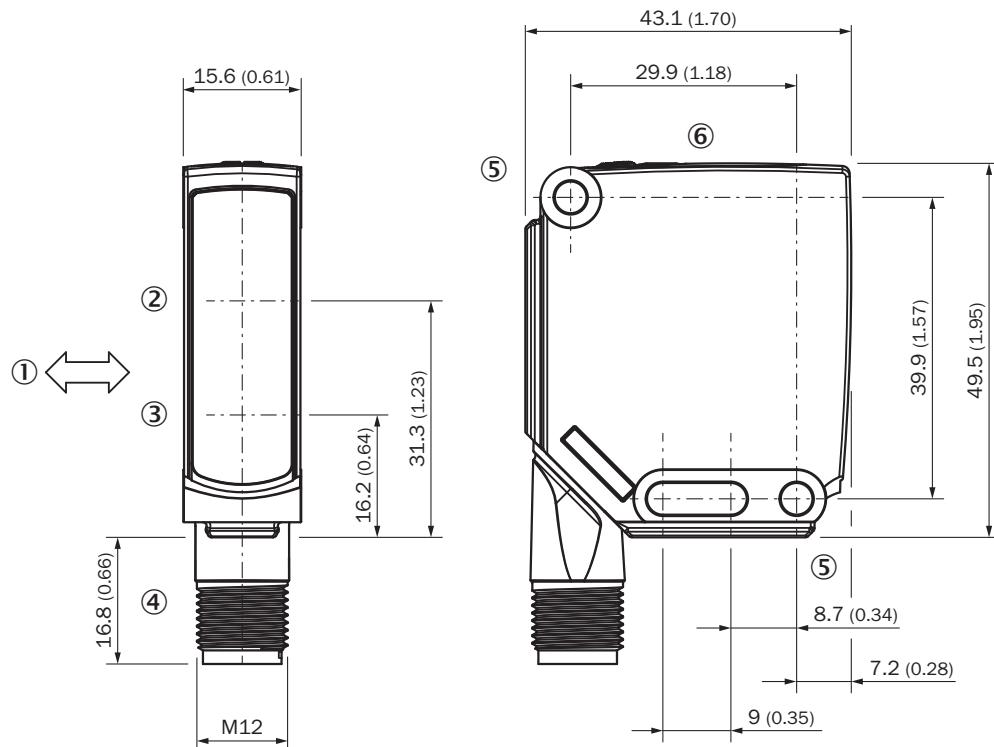
### Sensing range diagram



Recommended sensing range for the best performance

|   |   |
|---|---|
| A | Sensing range min. in mm                                  |
| B | Sensing range max. in mm                                  |
| C | Field of view   |
| D | Adjustable switching threshold for background suppression |
| E | Sensing range indicator                                   |
| F | Teach-Turn adjustment                                     |

### Dimensional drawing



Dimensions in mm (inch)

- ① Standard direction of the material being detected
- ② Center of optical axis, receiver
- ③ Center of optical axis, sender

- ④ Connection
- ⑤ Mounting hole, Ø 4.2 mm
- ⑥ display and adjustment elements

## Recommended accessories

Other models and accessories → [www.sick.com/W12](http://www.sick.com/W12)

|   | <b>Brief description</b>   | <b>Type</b>        | <b>part no.</b> |
|---|--|--------------------|-----------------|
| <b>Mounting systems</b>   |  |                    |                 |
|    | <ul style="list-style-type: none"> <li>• <b>Description:</b> Plate N03 for universal clamp bracket, zinc coated</li> <li>• <b>Material:</b> Steel, zinc diecast</li> <li>• <b>Details:</b> Zinc plated steel (sheet), Zinc die cast (clamping bracket)</li> <li>• <b>Items supplied:</b> Universal clamp (5322626), mounting hardware</li> <li>• <b>Usable for:</b> UC12, W14-2, W18-2, W18-3, W11-2, W12-3, W12-2 Laser, W12G, W12 Teflon, W16, W24-2 Ex, PowerProx, W11G-2, TranspaTect, W18-3 Ex, W24-2, PL50A, PL80A, PL40A, P250</li> </ul> | BEF-KHS-N03        | 2051609         |
|    | <ul style="list-style-type: none"> <li>• <b>Description:</b> Clamping block for dovetail mounting</li> <li>• <b>Material:</b> Aluminum</li> <li>• <b>Details:</b> Aluminum (anodised)</li> <li>• <b>Items supplied:</b> Mounting hardware included</li> <li>• <b>Suitable for:</b> W11-2, W12-3</li> </ul>   | BEF-KH-W12         | 2013285         |
|   | <ul style="list-style-type: none"> <li>• <b>Description:</b> Mounting bracket, large</li> <li>• <b>Material:</b> Stainless steel</li> <li>• <b>Details:</b> Stainless steel</li> <li>• <b>Items supplied:</b> Mounting hardware included</li> <li>• <b>Suitable for:</b> W11-2, W12-3, W16</li> </ul>  | BEF-WG-W12         | 2013942         |
|   | <ul style="list-style-type: none"> <li>• <b>Material:</b> Aluminum</li> <li>• <b>Details:</b> Aluminum</li> <li>• <b>Items supplied:</b> Including mounting material (sensor) and mounting material (bracket)</li> <li>• <b>Usable for:</b> Adapter plate for W23L/W27L to W12L</li> </ul>   | BEF-AP-W12         | 2127742         |
| <b>connectors and cables</b>  |  |                    |                 |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 4-pin, straight, A-coded</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Sensor/actuator cable</li> <li>• <b>Cable:</b> 5 m, 4-wire, PVC</li> <li>• <b>Description:</b> Sensor/actuator cable, unshielded</li> <li>• <b>Application:</b> Zones with chemicals, Uncontaminated zones</li> </ul>  | YF2A14-050VB3XLEAX | 2096235         |

|   | <b>Brief description</b> | <b>Type</b>      | <b>part no.</b> |
|---|--------------------------|------------------|-----------------|
| network devices   |                          |                  |                 |
|    |                          | SIG300-0A0GAA100 | 1131014         |
|    |                          | SIG300-0A04AA100 | 1131011         |
|    |                          | SIG300-0A05AA100 | 1131012         |
|  |                          | SIG300-0A06AA100 | 1131013         |

## SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

**For us, that is "Sensor Intelligence."**

## WORLDWIDE PRESENCE:

Contacts and other locations [www.sick.com](http://www.sick.com)